+CLAIMS

What is claimed is

1. A torsional vibration damper comprising: a first subassembly and a second subassembly rotatably moving relative to one another; and

- at least one coupling element including an essentially tangentially effective elastic element for interconnecting the first and second subassemblies, and at least one thrust piston connected to the elastic element,
- wherein during a first phase in which the first and second subassemblies rotate relative to one another about a predetermined angle of rotation, the thrust piston moves slower than said first subassembly and is moved faster than said first subassembly during a second phase when the rotation of the first and second subassemblies exceeds the predetermined angle of rotation, whereby the thrust piston applies upon the first subassembly in opposition to the rotation thereof a restoring force which increases with increase in the relative rotation of the first and second subassemblies above the predetermined angle of rotation.

2. A torsional vibration damper according to claim 1, wherein during the second phase the movement of said first subassembly leads to a translation into a movement of said thrust piston in correspondence to the relative angle of translation.

3. A torsional vibration damper according to claim 1, wherein the two subassemblies rotatably moving relative to one another around a common axis at increasing angles of rotation so that the relative rotation leads the thrust piston to be moved relative to said first subassembly around said common axis, whereby said thrust piston moves slower around said common axis than said first subassembly moves around said common axis at relative angles of rotation of less than 12° between said two subassemblies.

4. A torsional vibration damper according to claim 1, wherein said coupling element further comprises a second thrust piston in such a manner so that one thrust piston is located on each side of said elastic element and wherein the displacement of the first thrust piston leads the first thrust piston initially into a tilting motion relative to said first subassembly and relative to the second thrust piston.

5. A torsional vibration damper according to claim 1, wherein the thrust piston is displaced relative to said first subassembly by means of a guide surface of the first subassembly and by means of a guide surface of the second subassembly.

6. A torsional vibration damper according to claim 1, wherein the displacement of the thrust piston includes a sliding movement of said first subassembly underneath said thrust piston on said guide surface upon relative movement of said two subassemblies at least at a certain relative angle between said two subassemblies, while said thrust piston is acting onto said guide surface with a restoring force.

7. The torsional vibration damper according to claim 1, wherein said thrust piston being guided along mutual guide surfaces relative to said first and second subassemblies, so that in the first phase the thrust piston bears upon the second subassembly and in the second phase is radially tilted relative to the first position.

8. The torsional rotation damper of claim 1, wherein the coupling element has at least two thrust pistons which are brought into engagement with one another at a particular relative angle between the two subassemblies.

9. The torsional vibration damper of claim 1, wherein the coupling element further includes a second thrust piston and wherein the elastic element is a spring element, said thrust pistons each having a recess forming a lateral support surface for the spring element disposed between the thrust pistons, said spring element engaging the respective recess of each thrust piston.

10. The torsional vibration damper according to claim 9, wherein said two thrust pistons each have an axial external region formed with a slanted ramp surface.

11. The torsional vibration damper according to claim 10, wherein each piston is provided with a guide surface axially adjacent to the slanted ramp surface for contact upon one of the subassemblies.[page 16, lines 9 and 11]

12. The torsional vibration damper according to claim 1, wherein the coupling element has at least two thrust pistons which have at least a receiving position and an engagement position in relation to one of the two rotational subassemblies.

13. The torsional vibration damper according to claim 12, wherein one the thrust pistons is tilted radially inwards in its engagement position in relation to the other thrust piston.

14. The torsional vibration damper according to claim 12, wherein the thrust pistons are constrained in their engagement position by the two subassemblies.

15. The torsional vibration damper according to claim 12, wherein the elastic element acts as means for securing one of the two thrust pistons in its receiving position, when the other one of the two thrust pistons occupies its engagement position.

16. The torsional vibration damper according to claim 15, and further comprising means for forming a stop for preventing exiting of the engagement position of one of the two thrust pistons in the other thrust piston at commencing engagement.

17. The torsional vibration damper according to claim 1, wherein the coupling element essentially includes two identical thrust pistons positioned in opposite disposition.

18. The torsional vibration damper according to claim 8, wherein the thrust pistons are configured asymmetrical in relation to a radial plane of the torsional vibration damper.

19. The torsional vibration damper according to claim 15, wherein the elastic element is a spring element.

20. A torsional vibration damper comprising:

- a first subassembly and a second subassembly rotatably moving relative to one another at a various relative angle of rotation;
  - at least one coupling element comprising an essentially tangentially effective elastic element disposed at the thrust piston for interconnecting said two subassemblies and for opposing the rotatable movement between said two subassemblies, wherein a relative compression of the elastic element is dependent on the rotational movement between the two subassemblies leading to a degree of change in length of the elastic element which varies with the size of the rotational angle between the subassemblies.

21. A torsional vibration damper comprising:

- a first subassembly and a second subassembly rotatably moving relative to one another at a relative angle of rotation;
- at least one coupling element comprising an essentially tangentially effective elastic element for interconnecting said two subassemblies and for opposing the rotatable movement between said two subassemblies; and
- at least one thrust piston connected to said elastic element, said thrust piston being displaced relative to said first subassembly, while at the same time applying a restoring force on said first subassembly; and wherein said relative displacement of said thrust piston relative to said first subassembly varies in dependence on the size of the relative angle of rotation between said two subassemblies to thereby effect a degree of change in length of the elastic element;

22. A torsional vibration damper comprising:

- a first subassembly and a second subassembly rotatably moving relative to one another at a relative angle of rotation;
- at least one coupling element comprising an essentially tangentially effective elastic element for interconnecting said two subassemblies and for opposing the rotatable movement between said two subassemblies; and

- at least one thrust piston connected to said elastic element, said thrust piston being so guided along mutually responsive guide surfaces
- relative to said first and second subassemblies, that in a resting position the thrust piston bears upon the second subassembly and in a displacement position is tilted relative to the first position and bears upon the first subassembly to thereby impart a restoring force to the first subassembly.

23. A torsional vibration damper comprising:
   - a first subassembly and a second subassembly rotatably moving relative to one another at a relative angle of rotation;
   - at least one coupling element comprising an essentially tangentially effective elastic element for interconnecting said two subassemblies and for opposing the rotatable movement between said two subassemblies; and
   - at least one thrust piston connected to said elastic element, said thrust piston being displaced relative to said first subassembly, while at the same time applying a restoring force on said first subassembly; wherein said relative displacement of said thrust piston relative to said first subassembly varies in dependence on the size of the relative angle of rotation between said two subassemblies; and leads to a translation of the movement of said first subassembly into a movement of said thrust piston, whereby said translation varies with the size of the relative angles of rotation between said two subassemblies.

24. The torsional vibration damper of claim 1, wherein during the first phase the thrust piston bears upon a guide surface of the second subassembly and in the displacement phase, the thrust piston moves into a tilted position relative to the first subassembly while the rotational movement of the first subassembly is translated into a movement of the piston in dependence on the size of the relative rotational angle between the two subassemblies.

25. A process for damping torsional vibrations having two subassemblies rotatable relative to one another and so interacting with one another via at least one essentially tangentially effective elastic element that the length of the elastic element is changed in dependence on a relative angle between the two subassemblies by movement of at least one thrust piston, said movement being at least determined by a guide surface of one of the two subassemblies, said process comprising the step of varying the degree of change in length in dependence on the relative angle between the other subassembly and the guide surface.

26. The process according to claim 25, wherein the degree of change in length at small relative angle, starting from an idle position, is low.

27. The process according to claim 25, wherein the degree of change in length increases with increasing relative angle.

28. A process for damping torsional vibrations having two subassemblies rotatable relative to one another and so interacting via at least one elastic element that the length of the elastic element is compressed in dependence on a relative angle between the two subassemblies, said process comprising the step of varying the degree of compression by the relative angle between the other subassembly and the guide surface.

29. The process according to claim 28, wherein the degree of compression at small relative angle, starting from an idle position, is low .

30. The process according to claim 29, wherein the degree of compression increases with increasing relative angle.

31. A process for damping torsional vibrations having two subassemblies rotatable relative to one another and coupled to one another by at least one coupling element which opposes a relative movement of both subassemblies, said process comprising the step of displacing at least one thrust piston of the coupling element relative to one of the two subassemblies in dependence on a relative angle between the two subassemblies such that the thrust piston applies a restoring force upon a guide surface of the one subassembly.

32. The process according to claim 31, wherein the thrust piston is tilted according to and dependent on a particular range of relative angle with respect to the other one of the subassemblies.

33. The process according to claim 32, wherein the thrust piston is tilted between an idle position and a displacement position.

34. The process according to claim 31, wherein the displacement of the thrust piston is along the one subassembly at least in a particular range of relative angle and in dependence on the relative angle.

35. The process according to claim 34, wherein the thrust piston is displaced along a plane surface of the one subassembly .